

AEDG Implementation Recommendations: Daylighting Controls

The Advanced Energy Design Guide (AEDG) seeks to achieve 30 percent savings over Standard 90.1-1999. This guide focuses on improvements to small office buildings, less than 20,000 square feet. The recommendations below are adapted from the implementation section of the guide, and should be used in cooperation with the whole document.* The full design guide is available from the ASHRAE website, [Advanced Energy Design Guide for Small Office Buildings](#).

Expanded Recommendations for Daylighting Controls

The following recommendations will be necessary to achieve the 30% energy savings calculated for buildings with a 25% window-wall ratio or higher:

- Dimming Controls

Dimming controls. In office work areas, continuously dim rather than switch electric lights in response to daylight, to minimize employee distraction. Specify dimming ballasts that dim down to at least 10% of full output. Automatic multi-level daylight switching may be used in non-office environments like hallways, storage, restrooms, lounges, lobbies, etc. Locate luminaries in rows parallel to the window wall, and wire each row separately, if located in the daylight zone (within 12" from the window wall). The day lighting control system and /or photosensor should include a 5-minute time delay or other means to avoid cycling caused by rapidly changing sky conditions, and a one minute fade rate to change the light levels by dimming.

- Photosensor Specifications

Photosensor Specifications. Photosensors used for offices should be specified for the appropriate illuminance range (indoor or outdoor) and must achieve a slow, smooth linear dimming response from the dimming ballasts. When a daylighting system is designed to evaluate the combined illuminance from daylight and electric light sources (a "closed loop" system), photocells must have filtering or other strategy to achieve an equal response to the color spectrums of the different sources.

- **Calibration and commissioning are essential** : All lighting controls must be calibrated and commissioned after the furniture is in place but prior to occupancy. Include requirements in the specifications.

Photo sensor placement

A "closed loop" system is one where the interior photocell responds to the combination of daylight and electric light on the primary work surface. The best location for the photocell is above an unobstructed location such as an interoffice circulation path. The photocell is adjusted to achieve the desired light level at a light meter placed on the worst-case desktop. An "open loop" system is one where the photocell responds only to daylight levels but is still calibrated to the desired light level received at a desktop. The best location for the photo sensor is inside the window frame or skylight well.

The recommendations will only be successful and acceptable to owner and occupants if the lighting design safeguards for the quality and quantity of light are met.

Calibration and Commissioning

Even a few days of occupancy with poorly calibrated controls can lead to permanent overriding of the system and loss of all savings. Most photosensors require a daytime and nighttime calibration session. The photosensor manufacturer and the quality assurance provider should be involved in the calibration.



Daylight Levels

Occupants expect higher combined light levels in daylighted spaces. Consequently, it is more acceptable to occupants when the electric lights are calibrated to dim when the combined daylight and electric light level on the work surface exceeds 1.20 times the designed light level; i.e. if the ambient electric light level is designed for 35 maintained footcandles, the electric lights should begin to dim when the combined level is 42 footcandles. ($35 \times 1.20 = 42$). Local task lighting can supplement this level, but should be turned off during the calibration process.

Interactions

Energy savings due to reduced electrical consumption from daylighting should be weighed against any potential loss caused by increased cooling or heating loads.

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